C L A I M S

1. A method for processing an organosiloxane film, the method comprising:

loading a target substrate with a coating film formed thereon into a reaction chamber, the coating film comprising a polysiloxane base solution having an organic functional group; and

performing a heat process on the target substrate within the reaction chamber to bake the coating film,

wherein the heat process comprises

a first heating step of heating the coating film while forming an atmosphere with a first pH and a first process temperature within the reaction chamber, the first pH being set to promote hydrolysis reaction of the coating film, and

subsequently to the first heating step, a second heating step of heating the coating film while forming an atmosphere with a second pH and a second process temperature within the reaction chamber, the second pH being set to promote condensation reaction of the coating film.

2. The method according to claim 1, wherein the heat process is arranged to selectively supply an acidic gas and an alkaline gas into the reaction chamber, thereby adjusting pH inside the reaction chamber.

3. The method according to claim 2, wherein

the acidic gas comprises hydrogen, and the alkaline gas comprises ammonia.

4. The method according to claim 1, wherein the first pH is acidic value, and the second pH is alkaline value.

5. The method according to claim 1, wherein the first process temperature is selected from a temperature range that covers a temperature for dehydrating the coating film and a temperature for curing the coating film, and the second process temperature is selected from a temperature range for curing the coating film.

6. The method according to claim 5, wherein the first process temperature ranges from 25 to 400℃, and the second process temperature ranges from 150 to 400℃.

7. The method according to claim 5, wherein the first process temperature is set to be higher at an end of the first heating step than at a start thereof, and to be essentially equal at the end to the second process temperature.

8. A method for processing an organosiloxane film, the method comprising:

loading a target substrate with a coating film formed thereon into a reaction chamber, the coating film comprising a polysiloxane base solution having an organic functional group; and

performing a heat process on the target substrate within the reaction chamber to bake the coating film,

wherein the heat process comprises

a first heating step of heating the coating film while forming an atmosphere with a first pH and a first process temperature within the reaction chamber, the first pH being set to be less than 4.5 by supplying an acidic gas into the reaction chamber, and the first process temperature being set to range from 25 to 400℃,

subsequently to the first heating step, a purge step of purging the acidic gas from the reaction chamber, and

subsequently to the purge step, a second heating step of heating the coating film while forming an atmosphere with a second pH and a second process temperature within the reaction chamber, the second pH being set to be higher than 7 by supplying an alkaline gas into the reaction chamber, and the second process temperature being set to range from 150 to 400℃.

9. An apparatus for processing an organosiloxane film, by performing a heat process on a target substrate with a coating film formed thereon to bake the coating film, the coating film comprising a polysiloxane base solution having an organic functional group, the apparatus comprising:

a reaction chamber configured to accommodate the

target substrate;

a temperature adjusting section configured to adjust temperature inside the reaction chamber;

a pH-adjusting gas supply section configured to selectively supply an acidic gas and an alkaline gas into the reaction chamber so as to adjust pH inside the reaction chamber;

an exhaust section configured to exhaust gas inside the reaction chamber; and

a control section configured to control the temperature adjusting section, the pH-adjusting gas supply section, and the exhaust section.

10. The apparatus according to claim 9, wherein the acidic gas comprises hydrogen, and the alkaline gas comprises ammonia.

11. The apparatus according to claim 9, wherein the control section is configure to execute the heat process to comprise

a first heating step of heating the coating film while forming an atmosphere with a first pH and a first process temperature within the reaction chamber, the first pH being set to promote hydrolysis reaction of the coating film, and

subsequently to the first heating step, a second heating step of heating the coating film while forming an atmosphere with a second pH and a second process temperature within the reaction chamber, the second pH

being set to promote condensation reaction of the coating film.

12. The apparatus according to claim 11, wherein the first pH is acidic value, and the second pH is alkaline value.

13. The apparatus according to claim 11, wherein the first process temperature ranges from 25 to 400℃, and the second process temperature ranges from 150 to 400℃.

14. The apparatus according to claim 11, wherein the first process temperature is set to be higher at an end of the first heating step than at a start thereof, and to be essentially equal at the end to the second process temperature.

15. The apparatus according to claim 9, wherein the control section is configure to execute the heat process to comprise

a first heating step of heating the coating film while forming an atmosphere with a first pH and a first process temperature within the reaction chamber, the first pH being set to be less than 4.5 by supplying an acidic gas into the reaction chamber, and the first process temperature being set to range from 25 to 400℃,

subsequently to the first heating step, a purge step of purging the acidic gas from the reaction chamber, and

subsequently to the purge step, a second heating step of heating the coating film while forming an atmosphere with a second pH and a second process temperature within the reaction chamber, the second pH being set to be higher than 7 by supplying an alkaline gas into the reaction chamber, and the second process temperature being set to range from 150 to 400℃.